

Progress Report for the Office of NOAA Global Programs

Project:

Development of Archival Precipitation Data Sets for the GCIP Domain

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Summary

This brief report summarizes research conducted at IIHR Hydroscience & Engineering, a research institute of the University of Iowa in support of the GEWEX Continental-Scale International Project (GCIP). The collaborating institution, Princeton University, already submitted a separate report. The main objective of the work is to develop legacy high-resolution, long-term precipitation data sets for the Mississippi River basin.

The goals of the Global Energy and Water Cycle Experiment Continental-Scale International Project (GCIP) point to the need for high resolution data sets on all elements of the land surface and atmospheric hydrologic cycle. A high resolution precipitation data set has been derived from radar reflectivity observations taken from the National Weather Service WSR-88D radars in the continental U.S. The data set is available for a continuous five-year period (1996-2000) at an hourly, 4_4 km² resolution for the Mississippi River Basin. Development of the data set involved quality control, rainfall estimation and parameter estimation algorithms. Quality control algorithms included procedures to deal with radar calibration differences, an especially important problem in developing a long-term, continental-scale data set for diverse hydroclimatological applications. Rainfall estimation was based on a Z-R conversion algorithm. An important element of the procedure is the estimation of parameters for the Z-R algorithms. Initial comparisons of the radar-based product with a rain gauge based product show good agreement in the Mississippi River Basin. Validation of the product will be a continuing process as GCIP and GAPP researchers will be using the data set for years to come.

The main activity in the covered period has been the product validation. This is being accomplished via comparison of the rainfall estimates against high quality surface reference data sets, based mainly on rain gauge data. We have assembled rain gauge data sets from Oklahoma (both the Mesonet and the Micronet in the Washita River basin), the Iowa City Municipal Airport, the North Dakota network, and the Goodwin Creek basin in Mississippi. We also have Level II radar data and products available for these locations.

Validation of the radar-based precipitation data set at the resolution of 4_4 km² and hourly is a complicated task. We define validation as a description of the error probability distribution function of the radar-rainfall estimates. Validation of the product will be continuing for a long period as researchers will use the data set for modeling and water and energy budget studies for many years. We provide initial comparisons of the radar-based data set with rain gauges that are located in the Mississippi River Basin. Long-term comparisons show good agreement (Nelson et al. 2003b). However, there are still areas in the radar-based product that over or underestimate precipitation because of physical factors affecting the radar site such as range dependent effects, ground clutter, and beam blockage. We are continuing our validation studies and present a comprehensive evaluation in a near future publication (Nelson et al. 2003c).

We have distributed the radar-based precipitation product for the 5-year period to the University Corporation for Atmospheric Research's (UCAR) Joint Office for Scientific Support (JOSS). The data set is distributed in a compressed format of approximately 2.5 GB. Along with the precipitation data set we provided a Programmer's Application Interface (API), the GIS data browser tools, and documentation for obtaining and using the data set. The data are available through the JOSS GCIP website

(<http://www.joss.ucar.edu/gcip/legacy.html>). The data set is documented in Nelson et al. (2003a), the estimation algorithm is described in Nelson et al (2003b), Ciach et al. (2003) and Furey et al. (2003) used the data set in studying various hydrologic questions.

References:

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